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Sustainable Aquaculture for a Secure Future

Title: Environmental Impact of Aquaculture and Countermeasures to Aquaculture Pollution in China

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Abstract: **Goal, Scope and Background.** Aquaculture activities are well known to be the major contributor to the increasing level of organic waste and toxic compounds in the aquaculture industry. Along with the development of intensive aquaculture in China, concerns are evoked about the possible effects of ever increasing aquaculture waste both on productivity inside the aquaculture system and on the ambient aquatic ecosystem. Therefore, it is apparent that appropriate waste treatment processes are needed for sustaining aquaculture development. This review aims at identifying the current status of aquaculture and aquaculture waste production in China.

Main Features. China is the world's largest fishery nation in terms of total seafood production volume, a position it has maintained continuously since 1990. Freshwater aquaculture is a major part of the Chinese fishery industry. Marine aquaculture in China consists of both land-based and offshore aquaculture, with the latter mostly operated in shallow seas, mud flats and protected bays. The environmental impacts of aquaculture are also striking.

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Results. Case studies on pollution hot spots caused by aquaculture have been introduced. The quality and quantity of waste from aquaculture depends mainly on culture system characteristics and the choice of species, but also on feed quality and management. Wastewater without treatment, if continuously discharged into the aquatic environment, could result in remarkable elevation of the total organic matter contents and cause considerable economy lost. Waste treatments can be mainly classified into three categories: physical, chemical and biological methods.

Discussion. The environmental impacts of different aquaculture species are not the same. New waste treatments are introduced as references for the potential development of the waste treatment system in China. The most appropriate waste treatment system for each site should be selected according to the sites' conditions and financial status as well as by weighing the advantages and disadvantages of each system. Strategies and perspectives for sustainable aquaculture development are proposed, with the emphasis on environmental protection.

Conclusions. Negative effects of waste from aquaculture to aquatic environment are increasingly recognized, though they were just a small proportion to land-based pollutants. Properly planned use of aquaculture waste alleviates water pollution problems and not only conserves valuable water resources but also takes advantage of the nutrients contained in effluent. It is highly demanding to develop sustainable aquaculture which keeps stocking density and pollution loadings under environmental capacity.

Recommendations and Perspectives. The traditional procedures for aquaculture waste treatment, mainly based on physical and chemical means, should be overcome by more site-specific approaches, taking into account the characteristics and resistibility of the aquatic environment. Further research needs to improve or optimize the current methods of wastewater treatment and reuse. Proposed new treatment technology should evaluate their feasibility at a larger scale for practical application.

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